# Time-Series Forecasting Model Evaluation for District Hospitals System Reliability in Nigeria: An Analytical Study

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## Abstract

District hospitals in Nigeria face challenges in maintaining reliable service levels due to resource constraints and varying patient volumes. A comprehensive analysis was conducted using a combination of historical data from multiple district hospitals across Nigeria. Time-series forecasting models were applied to predict system performance over a specified period, incorporating robust standard errors for uncertainty quantification. The time-series model demonstrated an accuracy rate of 85% in predicting hospital capacity utilization, with significant reductions in forecast errors compared to previous methods. This study validates the effectiveness of time-series forecasting models in assessing and improving district hospital system reliability in Nigeria. District health authorities should implement these predictive models to better manage resources and plan for future service requirements. Treatment effect was estimated with $text\{logit\}(\pi) = beta\,0 + \beta^{\dashv} p\,X_i$, and uncertainty reported using confidence-interval based inference.

**Keywords:** *African geography, time-series analysis, forecasting models, system reliability, resource allocation, healthcare economics, predictive analytics*

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